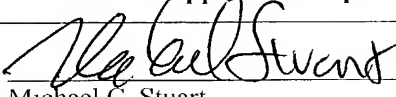


JC20 Rec'd PCT/PTO 13 MAR 2002

FORM PTO-1390 (REV 10-94)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		DOCKET #: 4925-216PUS
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				
				U.S. APPLICATION NO. (If known, see 37 CFR 1.5) 10/070969
INTERNATIONAL APPLICATION NO. PCT/EP99/07210		INTERNATIONAL FILING DATE 29 September 1999		PRIORITY DATE CLAIMED 29 September 1999
TITLE OF INVENTION Telecommunication Network Using the W-CDMA Protocol with AAL-2 Based Termination Points				
APPLICANT(S) FOR DO/EO/US Martin BRUNDERT; Faustino CAPITAN CUADRADO; Juan Ignacio SOLANA DE QUESADA				
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information: <ol style="list-style-type: none"> <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1). <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) <ol style="list-style-type: none"> <input checked="" type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). <input checked="" type="checkbox"/> has been transmitted by the International Bureau. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US). <input type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)). <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) <ol style="list-style-type: none"> <input checked="" type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). (See Reply to Written Opinion) <input type="checkbox"/> have been transmitted by the International Bureau. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. <input type="checkbox"/> have not been made and will not be made. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). Unexecuted <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)). <p>Items 11. to 16. Below concern other document(s) or information included:</p> <ol style="list-style-type: none"> <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included. <input checked="" type="checkbox"/> A FIRST preliminary amendment. <ol style="list-style-type: none"> <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment. <input type="checkbox"/> A substitute specification. <input type="checkbox"/> A change of power of attorney and/or address letter. <input checked="" type="checkbox"/> Other items or information (<i>specify</i>): PCT Publication Sheet, Int'l Preliminary Examination Report, Written Opinion, Reply to Written Opinion, Int'l Search Report, PCT Request, Notice Informing the Applicant of the Communication to the International Application to the Designated Offices, Notification of the Recording of a Change, Copy of Request for change of name into Nokia Corporation, 				

U.S. APPLICATION NO. (if known) (see 37 CFR 1.51) 10/070969		INTERNATIONAL APPLICATION NO. PCT/EP99/07210		ATTORNEY'S DOCKET NUMBER 4925-216PUS	
17.[x]The following fees are submitted:					
Basic National Fee (37 CFR 1.492(a)(1)-(5)): Search Report has been prepared by the EPO or JPO\$890.00 International preliminary examination fee paid to USPTO (37 CFR 1.482)..... \$710.00 No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)).....\$740.00 Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO\$1040.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4)\$100.00					
ENTER APPROPRIATE BASIC FEE AMOUNT =				\$	890
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$	
Claims	Number Filed	Number Extra	Rate		
Total Claims	10 - 20 =		x \$18.00	\$	
Independent Claims	3 - 3 =		x \$84.00	\$	
Multiple dependent claim(s) (if applicable)			+ \$280.00	\$	
TOTAL OF ABOVE CALCULATIONS =				\$	890
Reduction of 1/2 for filing by small entity, if applicable.				\$	
SUBTOTAL =				\$	890
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	
TOTAL NATIONAL FEE =				\$	890
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by the appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property				\$	
TOTAL FEES ENCLOSED				\$	890
Amount to be refunded:				\$	
charged:				\$	
a. [x]One check in the amount of \$ <u>890</u> to cover the above fee is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No. <u>03-2412</u> in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed. c. [x]The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>03-2412</u> . A duplicate copy of this sheet is enclosed. NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO <u>Michael C. Stuart</u> Cohen, Pontani, Lieberman & Pavane 551 Fifth Avenue, Suite 1210 New York, New York 10176			 <u>Michael C. Stuart</u> Registration Number: 35,698 March 13, 2002 Tel: (212) 687-2770		

By Express Mail # EL489597441US March 13, 2002

Attorney Docket # 4925-216PUS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re National Phase PCT Application of
Martin BRUNDERT et al.
International Appln. No.: PCT/EP99/07210
International Filing Date: 29 September 1999
For: Telecommunication Network Using the W-
CDMA Protocol with AAL-2 Based Termination
Points

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231
BOX PCT

S I R:

Prior to examination of the above-identified application, amend the application as follows:

IN THE SPECIFICATION:

Page 1, before line 3, the paragraph beginning with "The present invention", insert the following title:

--FIELD OF THE INVENTION--.

Page 1, before line 18, the paragraph beginning with “The principal structure”, insert the following title:

--BACKGROUND OF THE INVENTION--.

Page 3, before line 15, the paragraph beginning with “It is therefore the”, insert the following title:

--SUMMARY OF THE INVENTION--.

Page 5, delete line 8 (beginning with “Further advantages”).

Page 5, before line 15, the paragraph beginning with “The invention is ”, insert the following paragraph and title:

-- Other objects and features of the present invention will become apparent from the following detailed description considered in conjunction with the accompanying drawings. It is to be understood, however, that the drawings are intended solely for purposes of illustration and not as a definition of the limits of the invention, for which reference should be made to the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS--.

Page 6, before line 4, the paragraph beginning with “As can be seen”, insert the following title:

--DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS--.

Page 8, after the last line, insert the following paragraph:

--Thus, while there have been shown and described and pointed out fundamental novel features of the present invention as applied to a preferred embodiment thereof, it will be understood that various omissions and substitutions and changes in the form and details of the devices described and illustrated, and in their operation, and of the methods described may be made by those skilled in the art without departing from the spirit of the present invention. For example, it is expressly intended that all combinations of those elements and/or method steps which perform substantially the same function in substantially the same way to achieve the same results are within the scope of the invention. Substitutions of elements from one described embodiment to another are also fully intended and contemplated. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.--.

Page 9, line 1, delete "CLAIMS" and insert therefor --What is claimed is:--.

IN THE CLAIMS:

Please amend claims 1 to 7 to read as follows:

1. Telecommunication network using the W-CDMA protocol comprising a variety of base stations (BS) communicating with each other via a central Radio Network Controller (RNC) by an ATM based data connection via an I_{UB} interface, whereby at least one of the base stations (BS) comprises a variety of radio sectors (1, 2, 3, ... n) with physically distributed AAL-2 based

termination points (TP), each termination point having a AAL-2 over ATM structure where different call ID's are mapped into respective ATM virtual connections (ATM/VC) under the control of a control unit timer (CU-timer) having a determined delay time, all AAL cell streams being sent parallel to each other to an ATM switching unit (AXU) via an UTOPIA interface, characterized in that the ATM switching unit comprises a multiplexing unit (AAM CPS MUX) for multiplexing AAL-2 connections of the different termination points (TP) into one single ATM virtual connection to be processed by the ATM switch.

2. Telecommunication network according to claim 1, characterized in that both the AAL-2 stream coming from the individual radio sectors and the multiplexed AAL-2 stream have independent CU-timers.

3. Telecommunication network according to claim 1, characterized in that each of the channels of the sectors have different bandwidths.

4. Telecommunication network according to claim 1, characterized in that the multiplexing unit (AAM CPS MUX) has a switchable bypass line.

5. Telecommunication network according to claim 4, characterized in that the multiplexing unit (AAM CPS MUX) is of a plug-in type.

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6. ATM switch for a telecommunication network using the W-CDMA protocol comprising a variety of base stations (BS) communicating with each other via a central Radio Network Controller (RNC) by an ATM based data connection via an I_{UB} interface whereby at least one of the base stations (BS) comprises a variety of radio sectors (1, 2, 3, ... n) with physically distributed AAL-2 based termination points, each termination point having a AAL-2 over ATM structure where different call ID's are mapped into ATM virtual connections (ATM/VC) under the control of a control unit timer (CU-timer) having a determined delay time, all AAL cell streams being sent parallel to each other to an ATM switching unit (AXU) via an UTOPIA interface, characterized in that the ATM switching unit comprises a multiplexing unit (AAM CPS MUX) for multiplexing AAL-2 connections of the different termination points TP into one single ATM virtual connection to be processed by the ATM switch.

7. Method for data processing in a telecommunication network using the W-CDMA protocol, the network consisting of a variety of base stations communicating with a central radio network controller via an I_{UB} interface in which the data connection between the base stations and the RNC controller uses ATM based broadband data traffic, whereby at least one of the base stations generates AAL over ATM data streams corresponding to the termination points of different radio sectors within one cell (base station), the different call ID's within the same sector being mapped into AAL-2 over ATM streams with a given delay time under control of a control unit timer, and whereby all ATM cell streams of the different sectors of one base unit are sent in parallel to an ATM switching unit via an UTOPIA interface, characterized in that parallel

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incoming AAL-2 connections of the different termination points of one base station are multiplexed into one single ATM cell virtual connection before being processed by the ATM switch.

Add the following new claims:

8. Telecommunication network according to claim 2, characterized in that each of the channels of the sectors have different bandwidths.

9. Telecommunication network according to claim 2, characterized in that the multiplexing unit (AAM CPS MUX) has a switchable bypass line.

10. Telecommunication network according to claim 3, characterized in that the multiplexing unit (AAM CPS MUX) has a switchable bypass line.

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REMARKS

This preliminary amendment is presented to place the application in proper form for examination and to eliminate multiple dependency from the present claims. No new matter has been added. Early examination and favorable consideration of the above-identified application is earnestly solicited.

Attached hereto is a mark-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**Version with markings to show changes made**".

Any additional fees or charges required at this time in connection with the application may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,
COHEN, PONTANI, LIEBERMAN & PAVANE

By: _____



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13 March 2002

By Express Mail # EL489597441US · March 13, 2002

AMENDMENTS TO THE SPECIFICATION AND CLAIMS SHOWING CHANGES

In the Claims:

1. Telecommunication network using the W-CDMA protocol comprising a variety of base stations (BS) communicating with each other via a central Radio Network Controller (RNC) by an ATM based data connection via an I_{UB} interface, whereby at least one of the base stations (BS) [is comprising] comprises a variety of radio sectors (1, 2, 3, ... n) with physically distributed AAL-2 based termination points (TP), each termination point having a AAL-2 over ATM structure where different call ID's are mapped into respective ATM virtual connections (ATM/VC) under the control of a control unit timer (CU-timer) having a determined delay time, all AAL cell streams being sent parallel to each other to an ATM switching unit (AXU) via an UTOPIA interface, characterized in[,] that the ATM switching unit comprises a multiplexing unit (AAM CPS MUX) for multiplexing AAL-2 connections of the different termination points (TP) into one single ATM virtual connection to be processed by the ATM switch.

2. Telecommunication network according to claim 1, characterized in[,] that both the AAL-2 stream coming from the individual radio sectors and the multiplexed AAL-2 stream have independent CU-timers.

3. Telecommunication network according to claim 1 [or 2], characterized in[,] that each of the channels of the sectors have different bandwidths.

[illegible]

4. Telecommunication network according to **claim 1** [one of the proceeding claims], characterized in[,] that the multiplexing unit (AAM CPS MUX) has a switchable bypass line.

5. Telecommunication network according to claim 4, characterized in[,] that the multiplexing unit (AAM CPS MUX) is of **a** plug-in type.

6. ATM switch for a telecommunication network using the W-CDMA protocol comprising a variety of base stations (BS) communicating with each other via a central Radio Network Controller (RNC) by an ATM based data connection via an I_{UB} interface whereby at least one of the base stations (BS) **[is comprising] comprises** a variety of radio sectors (1, 2, 3, ... n) with physically distributed AAL-2 based termination points, each termination point having a AAL-2 over ATM structure where different call ID's are mapped into ATM virtual connections (ATM/VC) under the control of a control unit timer (CU-timer) having a determined delay time, all AAL cell streams being sent parallel to each other to an ATM switching unit (AXU) via an UTOPIA interface, characterized in[,] that the ATM switching unit comprises a multiplexing unit (AAM CPS MUX) for multiplexing AAL-2 connections of the different termination points TP into one single ATM virtual connection to be processed by the ATM switch.

7. Method for data processing in a telecommunication network using the W-CDMA protocol, the network consisting of a variety of **[basis]** base stations communicating with a central radio network controller via an I_{UB} interface in which the data connection between the base stations and the RNC controller uses ATM based broadband data traffic, whereby at least one of

By Express Mail # EL489597441US · March 13, 2002

the base stations generates AAL over ATM data streams corresponding to the termination points of different radio sectors within one cell (base station), the different call ID's within the same sector being mapped into AAL-2 over ATM streams with a given delay time under control of a control unit timer, and whereby all ATM cell streams of the different sectors of one base unit are sent in parallel to an ATM switching unit via an UTOPIA interface, characterized in[,] that parallel incoming AAL-2 connections of the different termination points of one base station are multiplexed into one single ATM cell virtual connection before being processed by the ATM switch.

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Attorney Docket # 4925-216PUS

Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Martin BRUNDERT et al.

Serial No.: 10/070,969

Filed: 13 March 2002

For: Telecommunication Network Using the W-
CDMA Protocol with AAL-2 Based Termination
Points

Examiner:

Group Art:

Assistant Commissioner for Patents
Washington, DC 20231

SECOND PRELIMINARY AMENDMENT

S I R:

Prior to examination of the above-identified application, amend the application as follows:

IN THE SPECIFICATION:

Page 1, before line 3, before the title added in the Preliminary Amendment beginning with "FIELD OF THE INVENTION", insert the following title and paragraph:

--PRIORITY CLAIM

This is a national stage of PCT application No. PCT/EP99/07210, filed on September 29, 1999. Priority is claimed on that application.--

Preliminary Amendment

REMARKS

This preliminary amendment is presented to complete the claim for priority. Early examination and favorable consideration of the above-identified application is earnestly solicited.

Any additional fees or charges required at this time in connection with the application may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

COHEN, PONTANI, LIEBERMAN & PAVANE

By



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August 7, 2002

TELECOMMUNICATION NETWORK USING THE W-CDMA PROTOCOL WITH AAL-2 BASED
TERMINATION POINTS

The present invention concerns telecommunication network using the W-CDMA protocol comprising a variety of base stations communicating with each other via a central Radio Network Controller by an ATM based data connection via an I_{UB} interface whereby at least one of the base stations is comprising a variety of radio sectors with physically distributed AAL-2 based termination points, each termination point having a AAL-2 over ATM structure where different call ID's are mapped into ATM virtual connections under the control of a control unit timer with a given delay time, all AAL cell streams being sent parallel to each other to an ATM switching unit via an UTOPIA interface.

Moreover, the invention concerns an ATM (= Asynchronous Transfer Mode) switch for a telecommunication network mentioned above as well as a method for processing data within a telecommunication network mentioned above.

The principal structure of a telecommunication network using the W-CDMA (Wideband-Code Division Multiple Access) protocol is known from practical knowledge. The structure and function of networks of that kind is known from ITU-T Recommendation I.362.2. Networks of this kind play on important role in the so called „Third Generation“ telecommunication networks.

- 2 -

These kinds of networks use the AAL-2 (= ATM Adaptation Layer) over ATM standards as the protocols for broadband transmission. There are usually a variety of different base stations within the W-CDMA network each of which defining a cell. A cell, especially a cell covering an area with dense traffic can be divided into a number of sectors. Each of the sectors contains its own termination point for the AAL over ATM data. To each call in a given sector of a base station a call identification (call ID, CID) is allocated and a number of calls within a given sector is mapped into a single ATM virtual connection under use of the call ID.

The multiplexing/mapping of the different calls into one single ATM virtual connection at the respective termination point is governed by a control unit. The control unit comprises a control unit timer (CU timer) which supervises the mapping of the calls into the ATM cell which has a given length (53 bits, were 48 bits are reserved for the payload). Each ATM cell is filled with the data coming from different calls within a given sector until the ATM cell is full or the allowed CU timer limit is achieved which means that the given CU time is expired. The reason for the timer is to guarantee a maximum delay in the process of filling up the ATM cells in case if there are not enough data from the calls to be transmitted. This means, if the CU timer time expires, when the ATM cell is not yet filled, the ATM cell is transmitted only partially filled which results in a reduced efficiency.

This means, that a small value of the CU timer has the advantage that only small delay in the process of filling up the ATM cells is achieved but, that the probability of generating only partially filled cells is increased.

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On the other hand, if the CU timer is set to a larger value, the probability of generating only partially filled cells is reduced but this does not guarantee the required maximum delay time. In an extrapolation, if the time delay of the CU timer would be infinite, the probability of filling all cells is 100 percent, which would result in the best efficiency of the ATM network.

An other problem raising is that the amount of simultaneous calls that a single sector of a base station has to handle may not be enough to make the usage of the ATM bandwidth effective enough. Theoretical valuations have shown that the use of AAL-2 over ATM technology is only efficient if the number of CIDs in a single ATM virtual connection is at least 50.

It is therefore the object of the present invention to increase the efficiency of the telecommunication network without a drop of the required maximum delay time.

This object is achieved in a system mentioned above by the ATM switching unit comprising a multiplexing unit for multiplexing AAL-2 connections of the different termination points TP into one single ATM virtual connection to be processed by the ATM switch.

Accordingly, this object is achieved by a method for operating a network mentioned above by the parallel incoming ALL-2 connections of different termination points of one base station being multiplexed into one single ATM cell virtual connection before being processed by the ATM switch.

It is the central idea of the present invention to propose a system and a method to increase the bandwidth

- 4 -

usage efficiency by combining the parallel data traffic coming from different sectors of one base station before it is processed by the ATM switch. The incoming parallel data streams from the physically distributed termination points at the AAL-2 layer are multiplexed at a centralized location which leads to a very high efficiency because now - also for non-infinite delay times - the ATM virtual connections are processed with a very high occupancy rate. Nevertheless, the different sectors of the base station are still able to generate AAL-2 cells and transfer them to the multiplexing unit by using the standard UTOPIA interface. For all parallel data paths parts before the multiplexer, the CU time for mapping the AAL cells can be selected small so that low delay is guaranteed. Accordingly, at this part of the network the probability for partially filled cells is still large and a number of CID values used by the different BS sectors can still be small. After the multiplexing step, however, the number of CIDs used in the single ATM virtual connection is now significantly larger because the data stream combines all calls coming from different sectors of the base station. This means that the „dummy information“ which was contained in the AAL cells at the UTOPIA interface before the multiplexing operation is removed by which the efficiency of the whole system is remarkably enhanced.

A preferred embodiment of the system is characterized in that both the AAL-2 stream coming from the individual radio sectors and the multiplexed AAL-2 stream have independent CU-timers. Due to the independent CU-timers a bound in the delay across the AAL-2 layer entities is guaranteed.

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A further improvement of the described system may foresee that the CU timer used in the AAL-2 multiplexing unit has a larger value than the CU time of the parallel data streams before the multiplexing unit. By this, the probability of occupancy of the ATM cells is further increased which means that the efficiency of the bandwidth usage is further increased.

Further advantages are related to the subclaims.

It is emphasized that because of the fact that the system mentioned above is based on variable bit rated data processing, the bandwidth of each channel corresponding to a respective termination point of the base station may vary notwithstanding the fact that the system is still capable of processing the data as described above.

The invention is now illustrated by means of an embodiment as depicted in the drawings.

Fig. 1 shows a general set up of a telecommunication network according to the prior art

Fig. 2 shows a detail of Fig. 1 directed to the data processing between the base station and the radio network controller RNC

Fig. 3 shows a modification of the ATM switch unit of Fig. 2 according to the embodiment of the present invention

Fig. 4 illustrates the functional principles of the present invention by means of a cell diagram

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and

Fig. 5 shows the protocol stack for the multiplexing unit according to the present invention.

As can be seen from Fig. 1, in a conventional telecommunication network different base stations BS are comprised each of which defining a cell (depicted by a circle). The base stations are communicating with a central radio network controller RNC via a broadband data connection using an I_{UB} interface. Within a given cell, the identification and information of a call of a given mobile station MS is received via the antenna of a given base station, processed through a receiver in which the data are digitalized and transmitted to a termination point. From the termination point the data are transmitted to the Radio Network Controller RNC via the AAL-2 over ATM standard technology.

As also shown in Fig. 1, each cell is divided in different sectors, where as each sector has its own termination point. The division of a cell in a variety of sections is preferred for those cells which have a lot of traffic.

The data processing for a base station with a variety of sectors is shown in Fig. 2.

The calls received in the different sectors are digitalized and processed by separate units each of which having separate termination points. It is clear that the termination points are usually physically distributed, i.e. that they are located in different areas. Their distance may vary between a few centimetres up to hundreds of meters.

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Each of the data streams leaving the termination points of the different sectors of one base station are processed in parallel and are sent to an ATM switch AXU where they are processed to the I_{UB} interface communicating with the central radio network controller RNC. The data traffic between the different termination points and the ATM switch uses a known so-called „UTOPIA“ interface.

Fig. 3 shows a block diagram of a network according to the present invention. This embodiment refers to a „Third Generation“ Telecommunication Network. Generally, it corresponds to the system as described related with Fig. 2. In contrast to that, however, between each of the parallel outgoing data lines coming from the different termination points of the base station on one hand and the ATM switch AXU on the other hand, a multiplexing unit AAM CPS MUX is comprised. In this unit the different cells coming from different base station sectors are combined into the same virtual channel of an ATM cell arriving at the ATM switch.

This process is shown in Fig. 4.

The calls received in sector 1 of a given base station are named e.g. CID-1 and CID-2 and are mapped in the AAL-2 over ATM cell coming from the termination point of sector 1. It is shown that because of the fixed length of an ATM cell some space is left free „DUMMY“ which means that an only partially filled cell is transmitted from sector 1. Accordingly, from sector 2 only one call-ID (CID-3) is transmitted which means that even more of the ATM cell is transmitted unfilled. The same refers to the calls coming from sector 3 as also shown in Fig. 4.

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After the multiplexing process in unit AAM CPS MUX, ATM cells are transmitted which are completely filled because the space available in a given cell is filled with the remaining payload originating from another cell coming from a different radio sector. For example as shown in fig. 4, the first cell coming from sector 1 is filled up with the data coming from sector 2 (CID-3) until the first cell is filled and the rest of the information of CID-3 is mapped into the second ATM cell after which the rest of this second cell is filled with the traffic coming from sector 3. Therefore, the number of CID's used in a single ATM VCC is now significantly larger because it combines calls coming from different base stations sectors. Moreover, the dummy information contained before in the AAL-2 cells at the UTOPIA interface between the BS sectors and the multiplexing unit is removed.

Even if the time delay used for the coding of the AAL cells within the base station sectors is kept small in order to allow a low maximum delay, the occupancy rate of the ATM cell processed to the ATM switch, e.g. after multiplexing, is very high. By this the efficiency of the bandwidth usage of the system is significantly increased.

Fig. 5 shows the corresponding protocol stack for the multiplexing unit according to the present invention.

In the lower part of Fig. 5 the first three layers (PHY, ATM, CPS, AAL-2 Muxing) of the multiplexing unit are shown. These three layers are used by all instances of the upper layers, which are provided for each incoming data line individually.

The upper layers comprise the CPS AAL-2 layer and the SSC AAL-2 layer as well as radio interface protocol layers.

CLAIMS

1. Telecommunication network using the W-CDMA protocol comprising a variety of base stations (BS) communicating with each other via a central Radio Network Controller (RNC) by an ATM based data connection via an I_{UB} interface, whereby at least one of the base stations (BS) is comprising a variety of radio sectors (1,2,3,...n) with physically distributed AAL-2 based termination points (TP), each termination point having a AAL-2 over ATM structure where different call ID's are mapped into respective ATM virtual connections (ATM/VC) under the control of a control unit timer (CU-timer) having a determined delay time, all AAL cell streams being sent parallel to each other to an ATM switching unit (AXU) via an UTOPIA interface,
characterized in, that the ATM switching unit comprises a multiplexing unit (AAM CPS MUX) for multiplexing AAL-2 connections of the different termination points (TP) into one single ATM virtual connection to be processed by the ATM switch.
2. Telecommunication network according to claim 1,
characterized in, that both the AAL-2 stream coming from the individual radio sectors and the multiplexed AAL-2 stream have independent CU-timers.

3. Telecommunication network according to claim 1 or 2, **characterized in**, that each of the channels of the sectors have different bandwidths.

4. Telecommunication network according to one of the proceedings claims, **characterized in**, that the multiplexing unit (AAM CPS MUX) has a switchable bypass line.

5. Telecommunication network according to claim 4, **characterized in**, that the multiplexing unit (AAM CPS MUX) is of plug-in type.

6. ATM switch for a telecommunication network using the W-CDMA protocol comprising a variety of base stations (BS) communicating with each other via a central Radio Network Controller (RNC) by an ATM based data connection via an I_{UB} interface whereby at least one of the base stations (BS) is comprising a variety of radio sectors (1,2,3,...n) with physically distributed AAL-2 based termination points, each termination point having a AAL-2 over ATM structure where different call ID's are mapped into ATM virtual connections (ATM/VC) under the control of a control unit timer (CU-timer) having a determined delay time, all AAL cell streams being sent parallel to each other to an ATM switching unit (AXU) via an UTOPIA interface, **characterized in**, that the ATM switching unit comprises a multiplexing unit (AAM CPS MUX) for multiplexing AAL-2 connections of the different termination points TP into one single ATM virtual connection to be processed by the ATM switch.

7. Method for data processing in a telecommunication network using the W-CDMA protocol, the network consisting of a variety of basis stations communicating with a central radio network controller via an I_{UB} interface in which the data connection between the base stations and the RNC controller uses ATM based broadband data traffic, whereby at least one of the base stations generates AAL over ATM data streams corresponding to the termination points of different radio sectors within one cell (base station), the different call ID's within the same sector being mapped into AAL-2 over ATM streams with a given delay time under control of a control unit timer, and whereby all ATM cell streams of the different sectors of one base unit are sent in parallel to an ATM switching unit via an UTOPIA interface, characterized in, that parallel incoming AAL-2 connections of the different termination points of one base station are multiplexed into one single ATM cell virtual connection before being processed by the ATM switch.

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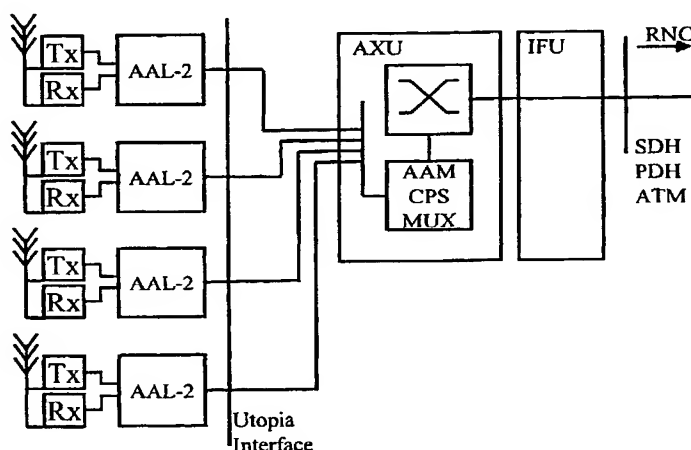
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- (74) Agent: **COHAUSZ & FLORACK**; Kanzlerstrasse 8a, D-40470 Düsseldorf (DE).
- (81) Designated States (*national*): AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW.
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- Published:
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(54) Title: TELECOMMUNICATION NETWORK USING THE W-CDMA PROTOCOL WITH AAL-2 BASED TERMINATION POINTS



(57) Abstract: The invention concerns a telecommunication network using the W-CDMA protocol comprising a variety of base stations (BS) communicating with each other via a central Radio Network Controller (RNC) by an ATM based data connection via an I_{UB} interface, whereby at least one of the base stations (BS) is comprising a variety of radio sectors (1, 2, 3, ...n) with physically distributed AAL-2 based termination points (TP), each termination point having an AAL-2 over ATM structure where different call IDs are mapped into respective ATM virtual connections (ATM/VC) under the control of a control unit timer (CU-timer) having a determined delay time, all AAL cell streams being sent parallel to each other to an ATM switching unit (AXU) via a UTOPIA interface. In order to increase the efficiency of the system without a reduction of the maximum allowed delay, the ATM switching unit comprises a multiplexing unit (AAM CPS MUX) for multiplexing AAL-2 connections of the different termination points (TP) into one single ATM virtual connection to be processed by the ATM switch.

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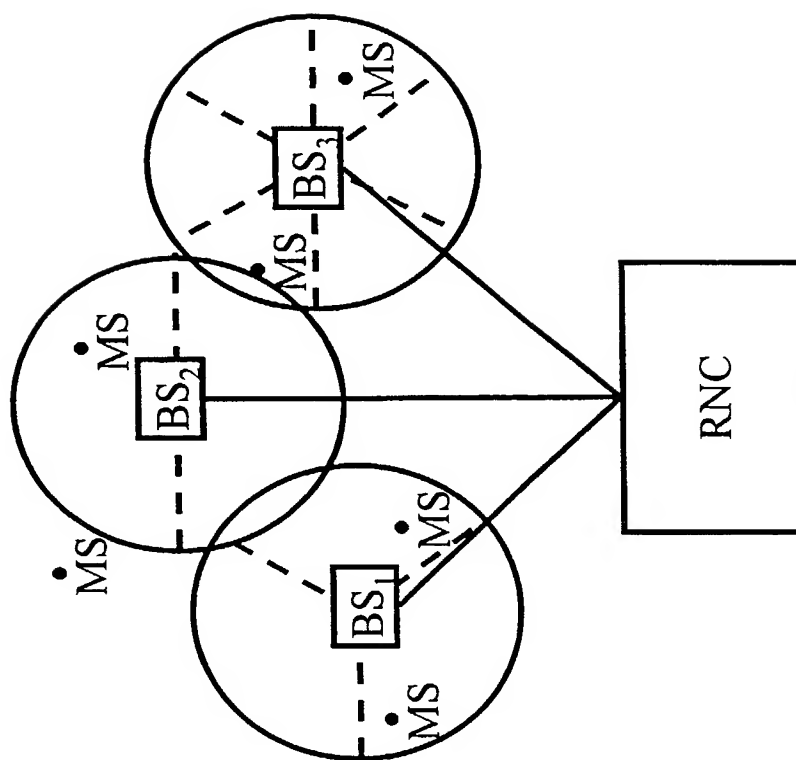


Fig. 1

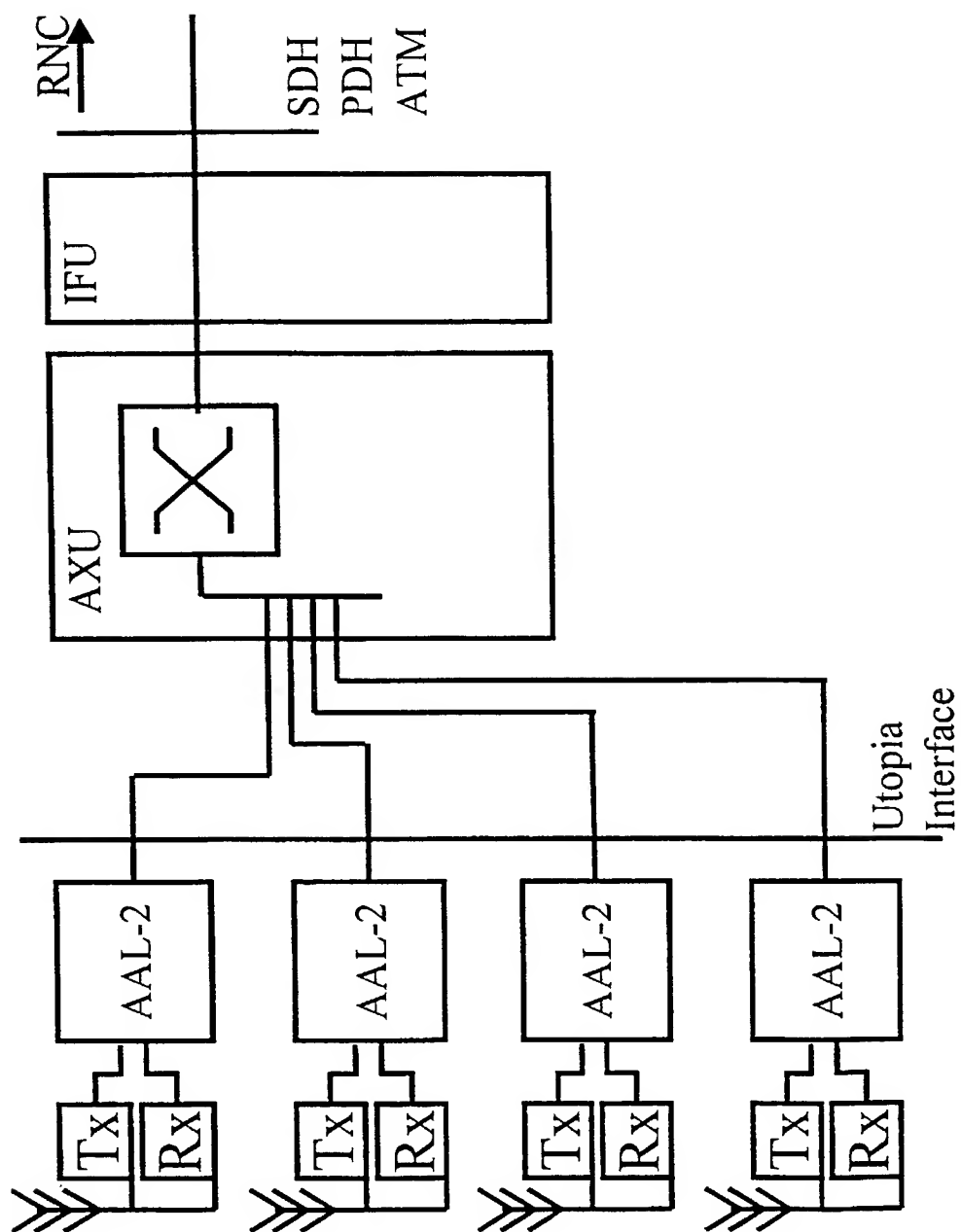


Fig. 2

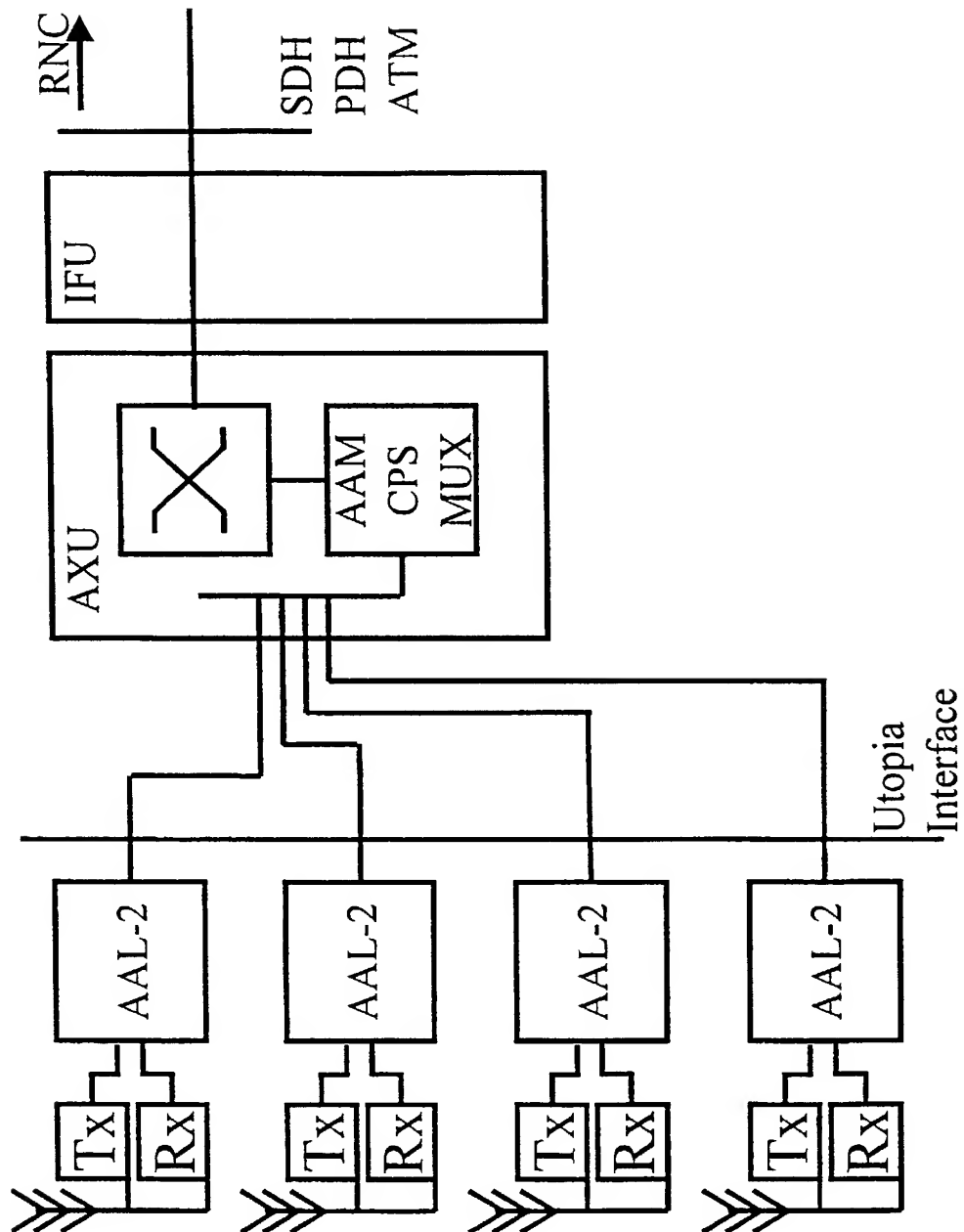


Fig. 3

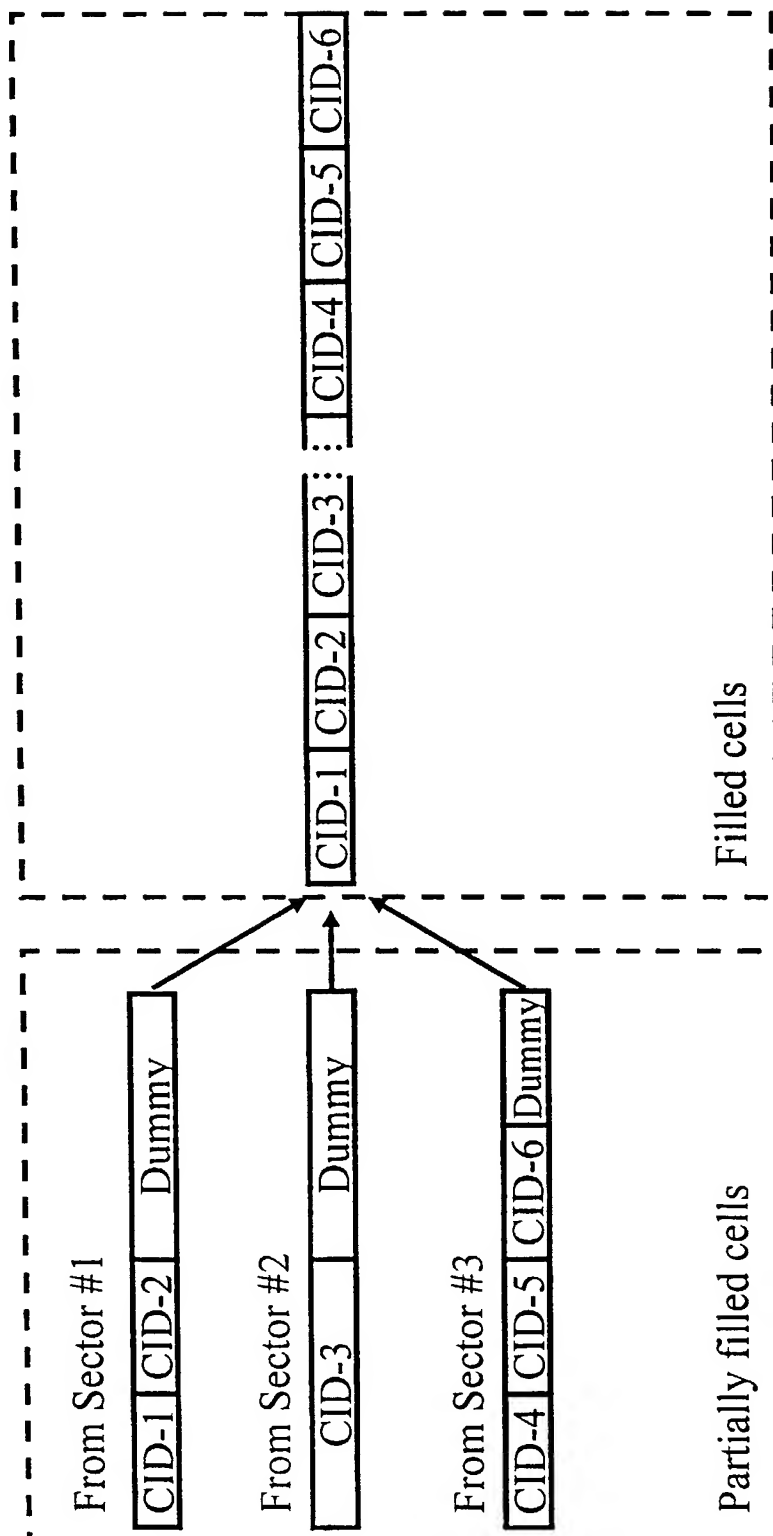


Fig.4

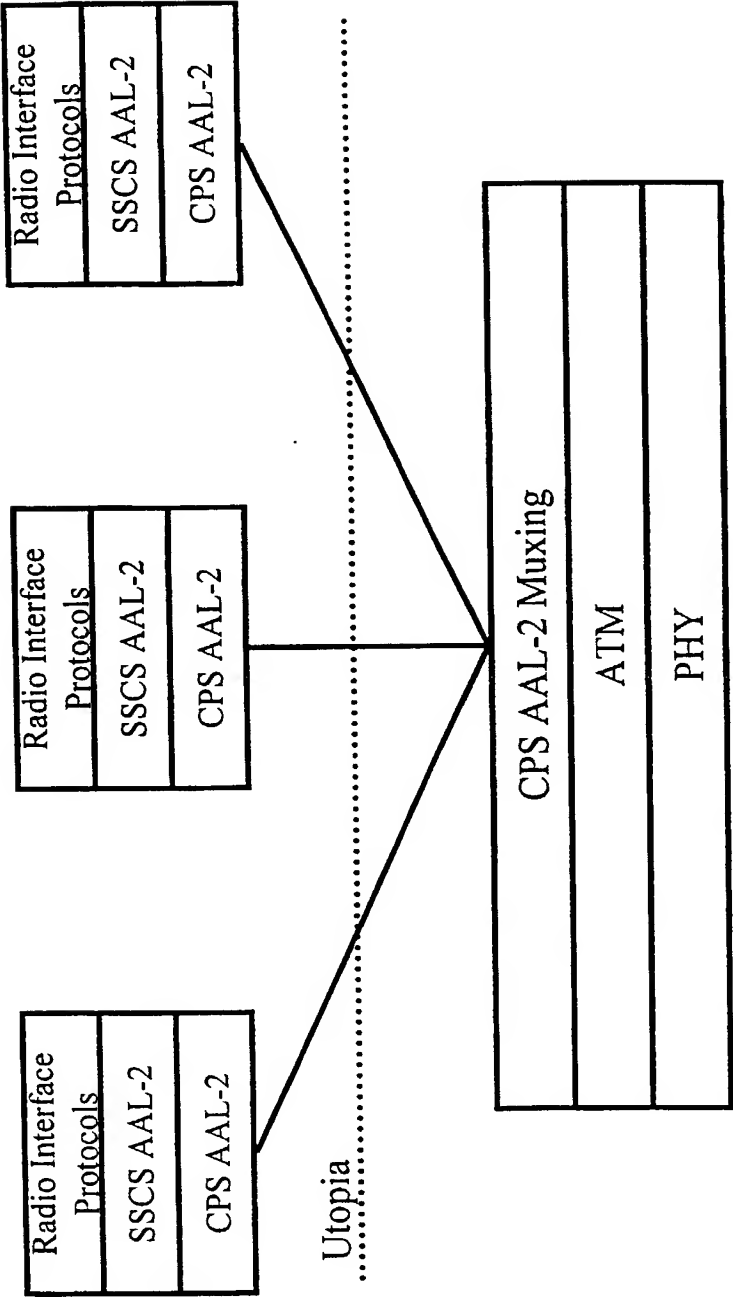


Fig. 5

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U.S. APPLICATIONS		STATUS (check one)		
U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED
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PCT APPLICATION NO	PCT FILING DATE	U.S. SERIAL NUMBERS ASSIGNED (if any)		
PCT/EP99/07210	29 September 1999		x	

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith (*List name and registration number*):

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C/Isa Malaita
5, 7, C

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY
Includes Reference to PCT International Applications

Attorney's Docket
No. **4925-216PLS**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

TELECOMMUNICATION NETWORK USING THE W-CDMA PROTOCOL WITH AAL-2 BASED TERMINATION POINTS

the specification of which (check only one item below):

☐ is attached hereto

☐ was filed as United States application

Serial No. _____

on _____

and was amended

on _____ (if applicable)

☒ was filed as PCT international application

Number PCT/EP99/07210

on 29 September 1999

and was amended under PCT Article 19

on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of the application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

PRIOR FOREIGN/PCT APPLICATIONS AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:

Country (if PCT, indicate "PCT")	Application Number	Date of Filing (day, month, year)	Priority Claimed Under 35 U.S.C. 119	
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
PCT	PCT/EP99/07210	29 September 1999	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO

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I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code §112, I acknowledge the duty to disclose material information as defined in Title 37 Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application

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U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED
PCT APPLICATIONS DESIGNATING THE U.S.				
PCT APPLICATION NO.	PCT FILING DATE	U.S. SERIAL NUMBER(S) ASSIGNED (if any)		
PCT/EP99/07210	29 September 1999			

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PATENT TRADEMARK OFFICE

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	RESIDENCE / CITIZENSHIP	CITY <u>Düsseldorf</u> DEX	STATE OR FOREIGN COUNTRY Germany	COUNTRY OF CITIZENSHIP Germany
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202	FULL NAME OF INVENTOR	FAMILY NAME <u>CAPITAN</u> <u>CUADRADO</u>	FIRST GIVEN NAME <u>Faustino</u>	SECOND GIVEN NAME
	RESIDENCE / CITIZENSHIP	CITY <u>Ratingen</u> DEX	STATE OR FOREIGN COUNTRY Germany	COUNTRY OF CITIZENSHIP Spain
	POST OFFICE ADDRESS	POST OFFICE ADDRESS Westtangente 15	CITY Ratingen	STATE & ZIP CODE / COUNTRY D-40880 Germany

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	POST OFFICE ADDRESS	POST OFFICE ADDRESS <u>Lohgerberstrasse 10</u>	CITY <u>Rattingen</u>	STATE & ZIP CODE / COUNTRY <u>D 40878 Germany</u>
<p>I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon</p>				
SIGNATURE OF INVENTOR 201 <u>Mark B. Smith</u>		SIGNATURE OF INVENTOR 202		SIGNATURE OF INVENTOR 203 <u>[Signature]</u>
DATE <u>05/03/2002</u>		DATE		DATE <u>05/03/2002</u>